

## WHAT IS CLAIMED:

1. An apparatus for producing castings with directional and single crystal structure, comprising a vacuum chamber inside which there is positioned an induction melting furnace, mold preheating furnace with a ceramic mold, mold transportation  
5 drive assembly consisting of a rod and an actuator for vertical movement, and a baffle separating a cooling zone and a heating zone; said apparatus being characterized in that the cooling zone means a water-cooled tank having a bottom portion and an upper portion being opened towards the  
10 heating zone.
2. The apparatus of claim 1 characterized in that the water-cooled tank is shaped as a truncated cone with its bottom portion having a smaller base than the upper portion of the tank.
- 15 3. The apparatus of claim 1 characterized in that a baffle articulates in a horizontal plane and consists of at least two sectors or segments, closely adjoining the ceramic mold during a solidification process.
- 20 4. The apparatus of claim 1 where the drive assembly further comprises a mold hanger.
5. The apparatus of claim 1 where said water-cooled tank can be used as a mold catch basin.
6. The apparatus of claim 1 where said mold contains a starter cavity for a crystal having a defined crystal orientation.
- 25 7. The apparatus of claim 1 where the water-cooled tank has a double wall.
8. The apparatus of claim 1 where the water-cooled tank is made of stainless steel.

9. A method of making a directional or single crystal alloy structure comprising the steps: placing a mold in a mold preheating furnace relative to a heater ; heating the mold to a temperature of about 100 to 150 °C above the liquidus temperature of a casting alloy; melting the casting alloy; pouring the molten alloy  
5 into the heated mold; lowering the mold with the molten alloy at a required rate from a heating zone into a cooling zone comprising a water-cooled tank; and solidifying the molten alloy by radiation onto the water-cooled walls of the tank.

10 10. The method of claim 9 where the mold passes through a baffle located between the heating zone and the cooling zone.

11. The article made according to the method of claim 9.

12. The article made according to the method of claim 9  
15 having a single crystal structure.

13. The article made according to the method of claim 9 comprising an airfoil.

14. The article according to claim 13 having a length greater than 30 inches.